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MCB 421(Petroleum Microbiology)

Biogenesis of Fossil Fuels

By

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Definition of Terms

- **Biogenesis:** This is referred to as the biological origin of fossil fuel.
- **Petroleum microbiology** is a branch of microbiology that deals with the study of microorganisms that can metabolize crude or refined petroleum products.
- **Hydrocarbonoclastic microorganisms:** These are microorganisms that can degrade hydrocarbons.
- **Petroleum:** It is otherwise referred to as rock oil.
- **Fossil fuel:** It means fuel that are gotten from dead plants and animals remains.

Introduction

- Petroleum or rock oil is a yellow-to-black naturally occurring liquid which is a mixture of aliphatic, aromatic and heterocyclic hydrocarbons.
- It includes oxygen, nitrogen and sulphur containing compounds.
- The aliphatic ones include straight chains such as methane, ethane, propane and butane.

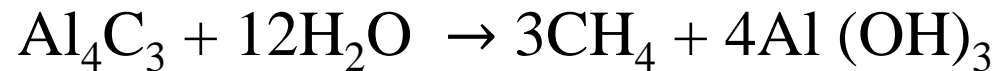
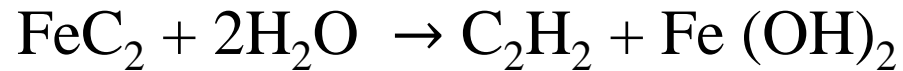
Introduction Cont'd

- Petroleum hydrocarbon has immensely benefitted man in a lot of ways
- These include power at homes, automobiles and industries as well as feed stocks of the petrochemical and allied industries;
- cosmetics, paints, inks, drugs, fertilizers, electronic casings, among others.

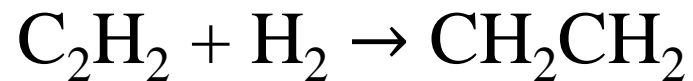
Origin of Petroleum Hydrocarbon

- **Inorganic**

- Reaction of metal carbides with water



- Hydrogenation of unsaturated hydrocarbons.



- **Organic**

- Geological and geochemical evidences
- With increased temperature and pressure, the plant and animals remains are transformed to crude oil.
- Permeable rocks allow oil to gush out while impermeable rocks are made permeable to allow release of oil.

Classification of Crude Oil

- By location of its origin, e. g West Texas Intermediate.
- By its relative weight or viscosity e.g. light, intermediate and heavy crude.
- By Sulphur content e. g sweet and sour.
- Sour has greater percentage of sulphur and requires more refining to meet correct products standard and specifications.
- However, Nigerian petroleum is classified as light or sweet with sulphur content in the range 0.1 - 0.3%.

Factors affecting Evolution of Crude Oil from Organic Matter

- Biological activities;
- temperature;
- pressure;
- Organic - inorganic matter;
- time;
- nature;
- abundance of organic matter;
- composition of minerals;
- structure of the rock and distribution of organic fluid phases.

Major stages involved in the Evolution of Crude oil

- **There are three stages involved viz – a - viz**
- **Diagenesis;**
- **Catagenesis and**
- **Metamorphosis:**

Diagenesis

- Dead animals and plants remains are buried and under increased temperature and pressure, Kerogen is formed.
- Kerogen found in various oil shales worldwide is waxy in nature.
- The most important hydrocarbon formed during diagenesis is methane.

Catagenesis

- There is thermal alteration of the kerogens formed during diagenesis,
- The aliphatic carbon chain in the kerogen molecules fragment disappears and
- There is re-ordering of the basic kerogen units.

Metamorphosis

- This is apparently the last stage of evolution of crude oil.
- In this case, temperature and pressure reach very high values.
- Rocks are exposed to the influence of magma and hydrothermal effects.
- In metamorphosis, coal transform into meth-anthracite which has a vitrinite reflectant of 40%.
- The constituents of kerogen are converted to graphite carbon.

The History of Oil Exploitation and Production (E & P) in Nigeria

- It actually commenced in 1908 when a German firm, Nigeria Bitumen Company began operation in the Western flank of the Niger Delta.
- However, the first commercial discovery was made by Shell at Oloibiri in 1956 and the first giant field Bomu, was discovered in 1958.
- Production reached 6,000barrels per day
- In February, 1958, export of Nigerian crude started.

Conclusion

- Fossil fuels are derived from organic matter which are important for a lots of activities ranging from production of daily consumables energy generation.
- The obvious that Our Country depends solely on it substantiate the need why we need to understand the dynamics of its origin, evolution, exploration and production.

Assignment

- List 10 oil companies currently operating in the country.
- List some of the oil producing communities within the oil-producing states.

References

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